PATENT
Docket No. 0649-0774P

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Toshiaki FURUHASHI et al.	CONF.:	5716
APPLN. NO.:	09/762,586	GROUP:	1761
FILED:	February 9, 2001	EXAMINER:	T. Tran Lien
FOR:	FROZEN PIE DOUGH SHOWING GOOD PUFFINESS		

DECLARATION UNDER 37 C.F.R. § 1.132

Assistant Commissioner of Patents
Washington, DC 20231

Sir:

I, Toshiaki Furuhashi, do declare and say as follows:

1. I am a graduate of the University of Tokyo, Department of Agricultural Chemistry, Food Engineering Lab.

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2. I reside at ~~5-202, 55-1, Kamikobashi, Sakai-machi, Sashima gun, Ibaraki 306-0434~~ 3-5-14, Midorichou, Kasukabe-Ci, Saitama 344-0063, Japan.

3. I was employed by Asahi Chemical Industry Co., Ltd., Japan, in the Foods Research Laboratory in 1980.

4. Since, 1999, I have been employed by Japan Tobacco Inc., Japan, in the food business division.

5. I am listed as one of the inventors of the subject of the above-identified application, and I have read and understand the application.

6. I have read and understand the contents in the USPTO Office Actions dated 06/18/2002 and 01/07/2002.

7. I have conducted experiments for the present invention, whereby the procedures and results of these experiments are hereby included. The experiments also involve comparative products that properly correspond to the products described in the reference, U.S. Patent Number 4,381,315 (Yong et al.; publication date of April 26, 1983; hereinafter referred to as "Yong '315").

8. The process for making the present invention is as follows:

Basic flow of the making process

Mixing of dough

Use a vertical mixer supplied by Kanto Kongouki (ball size 10L, use hook). Mixing time: 3 min at a low speed and 5 min at a medium speed (L 3 min M 5 min). Prepared in dough.

Roll-in fats (encirclement) - Addition of chemical leavening agent

Extend the dough so as to fix to the size of fats rolled-in. The chemical leavening agent is dispersed on the surface of the dough followed by enwrapping the roll-in fats with the dough.

Interfolding step

Use a reverse sheeter supplied by Kamata Kikai. Interfold by 2, 4 and 4 foldings to make 32 layers, and 4 and 4 foldings to make 16 layers.

Rolling of final dough

Adjust a clearance of the reverse sheeter to target a dough thickness of 3 mm. But there were some experiments in which 3 mm thickness could not be prepared due to dough extensibility and being sticky (causes of dough roughness).

Preparation of products

(Apple pie)

Prepared by cutting into a lower dough: 60 mm x 150 mm and an upper dough: 65 mm x 160 mm. Apple fillings (35 g) are enwrapped (overlaid) with the upper and lower dough to afford the product.

(Sheet dough)

Cut into a rectangular shape at 100 mm x 100 mm. Determine a dough density. But, the sizes vary due to the difference of dough shrinkage rates. The actual size was rendered the length.

Freezer

Frozen down in 40 min by a rapid freezer at -35°C.

Physical properties of the fats used (roll-in)

Temperature		Fats used in the experiments		Physical properties of reference shortening (Specifications	
°C	°F	Roll-in margarine	Roll-in shortening	Min.	Max.
5	41		56		
10	50	43	52	36	60
15	59		42		
20	68	30	36	23	55
25	77	28	33	21	52
30	90	21	26	14	42
35	95	13	18		
40	104		7	2	22

9. The results of the experiments are as shown in the following tables.

Table 1: Contents of Experimental examples for Present Invention for pie (formulation and adjustment)

Test No. 1. Basic example in the present invention (corresponding to Example 1 in Specification)

Test No. 2. Formulation of minimum roll-in fat quantity and maximum chemical leavening agent in the present invention (formulation closest to the reference formulation) (closest to Example 5 in Specification)

Test No. 3 The roll-in fat in Test No. 2 are replaced with shortening, and the dough formulation and making method are the same as those in Test No. 2.

	Test No. 1		Test No. 2		Test No. 3	
Raw materials	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio
Hard flour	75.0 %	32.22 %	75.0 %	34.97 %	75.0 %	34.97 %
Soft flour	25.0 %	10.74 %	25.0 %	11.66 %	25.0 %	11.66 %
Water	55.0 %	23.63 %	55.0%	25.64%	55.0 %	25.64 %
Salt	1.8 %	0.77 %	1.8 %	0.84 %	1.8 %	0.84 %
Sugar	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %
Kneading in fat (shortening)	8.0 %	3.436 %	8.0 %	3.73 %	8.0 %	3.73 %
Roll in margarine	65.0 %	27.92 %	45.0 %	20.98 %	0.0 %	0.00 %
Roll in shortening	0.0 %	0.00 %	0.0 %	0.00 %	45.0 %	20.98 %
Leavening agent	3.0 %	1.29 %	4.7 %	2.19 %	4.7 %	2.19 %
(Baking soda)	0.96 %	0.41 %	1.50 %	0.70 %	1.50 %	0.70 %
(Acidic agent mix)	1.23 %	0.53 %	1.92 %	0.90 %	1.92 %	0.90 %
Total	233 %	100 %	214 %	100 %	214 %	100 %

Pie dough quantity	164.8 %	70.8 %	164.8 %	76.8 %	164.8 %	76.8 %
Roll-in fat quantity	65.0 %	27.92 %	45.0 %	20.98 %	45.0 %	20.98 %
Roll-in fat quantity based on pie dough	39.4 %	39.4 %	27.3 %	27.3 %	27.3 %	27.3 %

Mixing Kneading temperature	L 3 min, M 5 min , 18°C Good hardness	L 3 min, M 5 min, 21°C Good hardness	L 3 min, M 5 min, 20°C Good hardness
Roll-in operation	2x4x4, Good extension	2x4x4, Good extension	2x4x4, Good extension
Number of layers (fat layers)	32 layers	32 layers	32 layers
Time from adding leavening agent to placing in a freezer	30 min	30 min	30 min

Thickness of final dough (calculated by a dough gravity as 1.1)	2.88 mm	2.98 mm	3.00 mm
Calculation Thickness of fat layer Thickness of dough layer	 0.0251 mm 0.0637 mm	 0.0196 mm 0.0717 mm	 0.0197 mm 0.0720 mm

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Table 2: References- Comparative experimental examples

Test No. 1 10% (max) of roll-in fat (lamination fat), 0.7 % (min) of alkali leavening agent (baking soda) based on the dough within the reference specification.
The dough formulation was adjusted so as to be close to the formulation of the reference specification. The making method is according to Test No. 1 of the invention.

Test No. 2 Prepared such that roll-in fat quantity is 10% based on the dough (kneading in/roll-in) at a maximum of fat quantity capable of being added (2 to 25%, the range described in the reference specification). The others are the same as those in Test No. 1. The making method is according to Test No. 1 of the present invention.

Test No. 3 Formulation the same as the reference example. The making method is the same as Test No. 1 of the present invention.

Test Nos. 4 & 5 Prepared such that the quantity of fat is maximum within the formulation (flour/fat/water etc.) of the reference specification. Test Nos. 4 and 5 have 32 layers and 16 layers, respectively.

(Examples prepared such that they are the same or closest to the present invention and the references, where Test No.3 is similar or the same as the reference example)

	Test No. 1		Test No. 2		Test No. 3		Test No. 4		Test No. 5	
Raw materials	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio	Formulation ratio based on flour	Formulation ratio
Hard flour	100.0 %	53.22 %	100.0 %	44.23 %	100.0 %	55.01 %	100.0 %	46.90 %	100.0 %	46.90 %
Soft flour	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %
Water	56.4 %	30.02 %	56.4 %	24.94 %	56.4 %	31.02 %	59.0 %	27.67 %	59.0 %	27.67 %
Salt	1.8 %	0.96 %	1.8 %	0.80 %	1.8 %	0.99 %	2.2 %	1.03 %	2.2 %	1.03 %
Sugar	7.3 %	3.89 %	7.3 %	3.23 %	7.3 %	4.02 %	8.5 %	3.99 %	8.5 %	3.99 %
Kneading in fat (shortening)	1.8 %	0.96 %	36.5 %	16.14 %	1.8 %	0.99 %	20.0 %	9.38 %	20.0 %	9.38 %
Roll-in margarine	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %	0.0 %	0.00 %
Roll-in shortening	16.7 %	8.89 %	20.2 %	8.93 %	9.1 %	5.01 %	19.1 %	8.91 %	19.0 %	8.91 %
Baking soda	1.3 %	0.69 %	1.3 %	0.57 %	1.8 %	0.99 %	1.5 %	0.70 %	1.5 %	0.70 %
Acidic agent mix (GDL)	2.6 %	1.38 %	2.6 %	1.15 %	3.6 %	1.98 %	3.0 %	1.41 %	3.0 %	1.41 %
Total	187.9 %	100.0 %	226.1 %	100.0 %	181.8 %	100.0 %	213.2 %	100.0 %	213.2 %	100.0 %
Pie dough quantity	167.3 %	89.0 %	202.0 %	89.3 %	167.3 %	92.0 %	189.7 %	89.0 %	189.7 %	89.0 %
Roll-in fat quantity	16.7 %	8.89 %	~~22.2 0.0~~ %	8.93 %	9.1 %	5.01 %	19.0 %	8.91 %	19.0 %	8.91 %
Roll-in fat quantity based on pie dough	10.0 %	10.0 %	10.0 ~~0.0~~ %	10.0 %	5.4 %	5.4 %	10.0 %	10.0 %	10.0 %	10.0 %

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Mixing,	L 3 min, M 5 min	L 3 min, M 2 min	L 3 min, M 5 min ,	L 3 min, M 2 min ,	L 3 min, M 2 min ,
Roll-in operation	2x4x4, slightly rough	2x4x4, rough dough	2x4x4, dough with cut	2x4x4. rough dough	4x4, rough dough
No. layers (fat layers)	32	32	32	32	16
Time from adding leavening agent to placing the dough in freezer	30 min	30 min	30 min	30 min	30 min

Thickness of final dough (calculated by a dough gravity as 1.1)	2.91 mm	3.95 mm	3.33 mm	4.27 mm	3.95 mm
Calculation Thickness of fat layer Thickness of dough layer	 0.0081 mm 0.0809 mm	 0.0110 mm 0.1103 mm	 0.0052 mm 0.0959 mm	 0.0119 mm 0.1188 mm	 0.0220 mm 0.2195 mm

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Table 3: Dough attributes and baking evaluation of apple pies

Jet oven at 270°C for 6 min

	Examples of the present invention			Reference examples				
	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 4	Exp. No. 5
Density of pie dough	1.054	1.046	1.036	1.033	0.960	0.885	1.018	0.975
Space layer	Presence	Presence	Presence	Presence	Abundance	Abundance	Abundance	Abundance
Quantity of residual gas ml/g	0.57	0.82	0.85	0.84	0.92	1.28	0.82	0.93
Weight of apple pie g	93.0	94.5	95.1	90.2	93.8	105.3	119.1	103.2
Lifting mm								
Maximum	28	30	35	20	22	22	22	22
Minimum	24	23	25	15	18	20	20	20
Vertical interval	4	7	10	5	4	2	2	2
Stability	Evenly stable	Stable	Stable	Evenly stable	Evenly stable	Evenly stable	Evenly stable	Evenly stable
Appearance								
Lifting condition	7	8	8	3	4	4	4	4
Layered condition	8	8	8	3	3	1	2	3
Short piecrust								
Whole	8	7	7	3	3	2	2	3
Heated through								
Filling portion	7	8	7	4	3	5	3	3
Taste of piecrust	Good	Slightly bitter	Slightly bitter	Bitter	Bitter	Bitter	Bitter	Bitter

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Table 4: Dough attributes and baking evaluation

Convection oven 200°C for 15 min

	Examples of the present invention			Reference examples				
	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 4	Exp. No. 5
Density of pie dough	1.054	1.046	1.036	1.033	0.960	0.885	1.018	0.975
Space layer	Presence	Presence	Presence	Presence	Abundance	Abundance	Abundance	Abundance
Quantity of residual gas ml/g	0.57	0.82	0.85	0.84	0.92	1.28	0.82	0.93
Weight of apple pie g	94.2	98.9	95.4	92.1	97.2	105.7	114.5	96.4
Lifting mm								
Maximum	40	35	35	20	20	20	20	22
Minimum	32	25	30	20	15	20	20	20
Vertical interval	8	10	5	0	4	0	0	2
Stability	Stable	Stable	Evenly Stable	Evenly stable	Evenly stable	Evenly stable	Evenly stable	Evenly stable
Appearance								
Lifting condition	9	8	9	3	4	4	4	4
Layered condition	8	8	8	3	3	1	3	4
Short piecrust								
Whole	9	9	9	3	3	3	3	3
Heated through								
Filling portion	8	8	8	5	3	5	3	3
Taste of piecrust	Good	Slightly bitter	Slightly bitter	Bitter	Bitter	Bitter	Bitter	Bitter

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Table 5: Baking results of the pie dough alone

Jet oven at 250°C for 6 min

	Examples of the present invention			Reference examples				
	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 1	Exp. No. 2	Exp. No. 3	Exp. No. 4	Exp. No. 5
Density of pie dough	1.054	1.046	1.036	1.033	0.960	0.885	1.018	0.975
Space layer	Presence	Presence	Presence	Presence	Abundance	Abundance	Abundance	Abundance
Quantity of residual gas ml/g	0.57	0.82	0.85	0.84	0.92	1.28	0.82	0.93
Weight of apple pie g	30.5	31.1	30.7	29.5	38.6	32.6	42.4	42.2
Lifting mm								
Maximum	35	35	35	25	32	10	15	12
Minimum	30	28	28	13	20	10	10	10
Vertical interval	5	7	7	12	12	0	5	2
Stability	Evenly Stable	Stable	Stable	Uneven with large voids	Uneven with large voids	Everly stable	Stable	Evenly stable
Appearance								
Lifting condition	9	8	9	4	4	2	2	2
Layered condition	8	8	7	2	2	1	3	4
Short piecrust Whole	8	8	7	3	3	2	2	3

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10. The attached photographs:

Twenty-seven photographs of the experiments were also taken (submitted on a total of twelve sheets). The photographs show the appearance of the present invention as tested, and the tested reference dough.

11. I now explain the significance of the results of the experiments.

The presently claimed pie dough can be used in making a pie. The proper balance of the amounts of wheat flour, water, and roll-in fat in the pie dough is important. As described in the specification, a certain amount of dough and roll-in fat is needed to obtain the desired hardness.

With regard to the chemical leavening agent, it is important to balance (1) the amount of the chemical leavening agent for forming gas until freezing (formation of appropriate space layers), and (2) the amount of the remaining chemical leavening agent for forming gas for expansion upon baking. Thus, it is important to select the type(s) of chemical leavening agent and control the amount(s) thereof.

In testing comparative examples for the present invention, the dough represented by Tests 2, 4 and 5 were used as appropriate examples of the Yong '315 reference. Tests 2, 4 and 5 included fats/water.

As can be seen, the reference dough was soft and sticky and it was difficult to obtain a good-working pie dough. This is because the process of making and the composition of the wheat dough of Yong '315 is more bread-like. Test 3 represents the basic composition of this reference dough. Because bread properties are intended in Yong '315, the reference dough cannot be made into a thin layer (about 3 mm), which is in contrast to the present invention. Also, if this reference dough is made into a thin layer for a pie crust, the reference dough will break.

In contrast, the present invention uses a combination of a quick action type chemical leavening agent and a delayed action type chemical leavening agent. This combination of agents generates voids between or among the dough and/or fat layers, while a chemical leavening agent (*i.e.*, delayed action type) may remain unreacted prior to baking.

As can be seen in the experimental results, because the chemical leavening agent remains in the space layers in the dough in a free

condition (not oil coating of Reference 2), the reactivity upon the baking is fast and can form gas during the initial stage of baking. Thus, the taste and appearance of the piecrust is unexpectedly better.

Further, as can be seen from the twenty-seven photographs of the experiments, the present invention baked at 200°C at 15 minutes and at 250°C at 6 minutes shows much better appearance (*i.e.*, good puffiness) over the reference examples. Some of the reference examples even demonstrate significant over-baking or charring of the dough. This charring is because baking the reference dough of Yong '315 in an oven at a relatively high temperature at shorter period of time results in the outside parts of the dough undesirably baking much faster than the inside part.

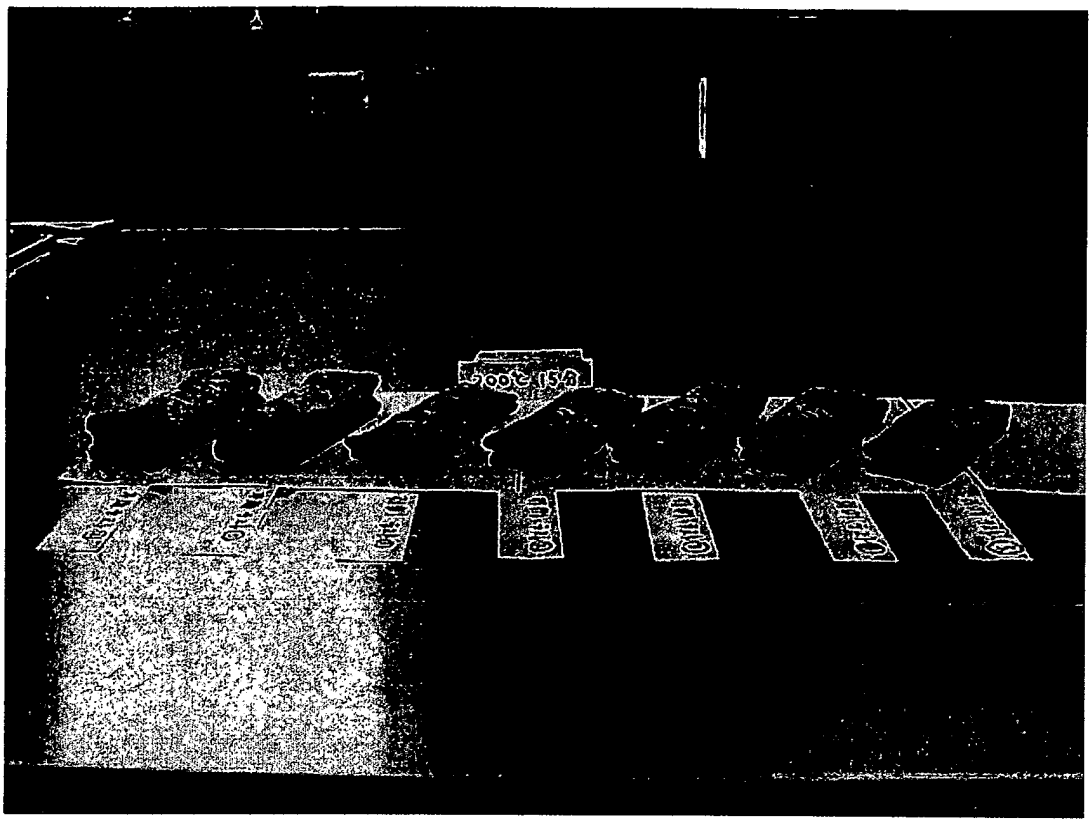
When the present invention of a frozen pie product is placed directly into a high-power oven for a relatively short period of time, the present invention unexpectedly produces a crust having a crispy texture and a favorable layered structure (see the photographs ~~labeled as "Test No. __~~ of the present invention and Reference"). Nov. 05, 2002 T.F.

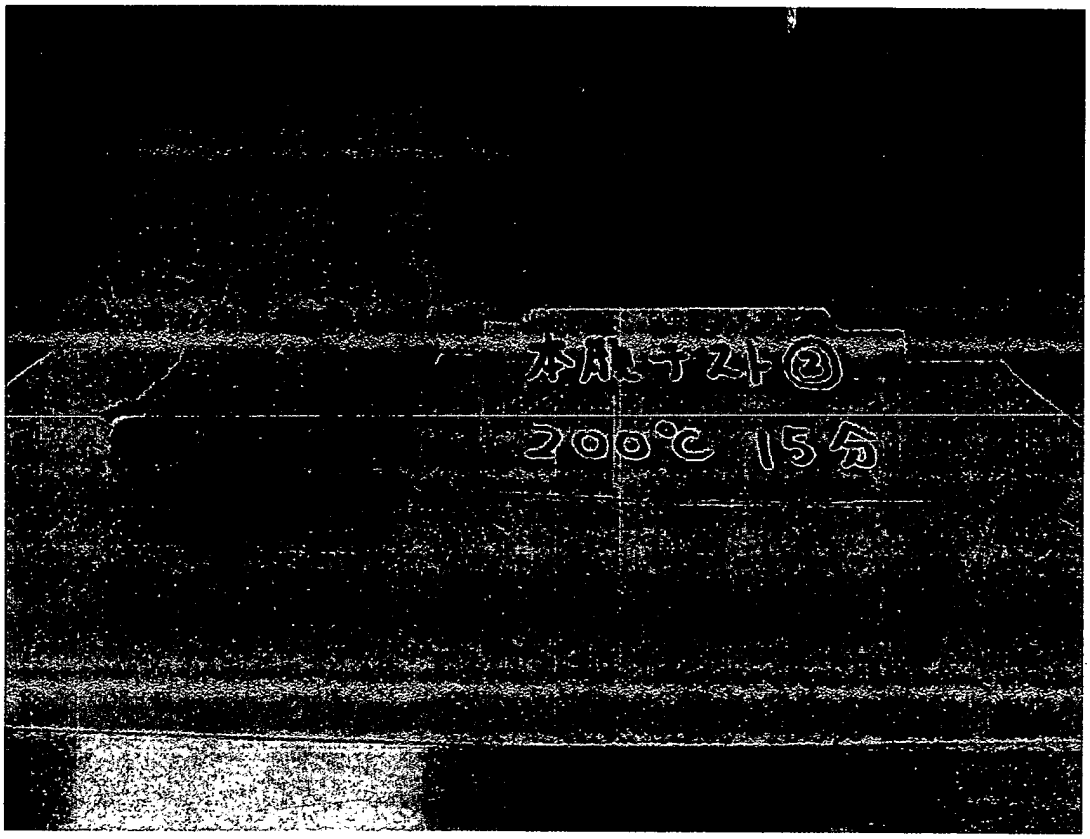
12. I hereby declare that all statements made herein of my own knowledge are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: November 5, 2002

By Toshiaki Furuhashi
Toshiaki Furuhashi
Japan Tobacco Inc.

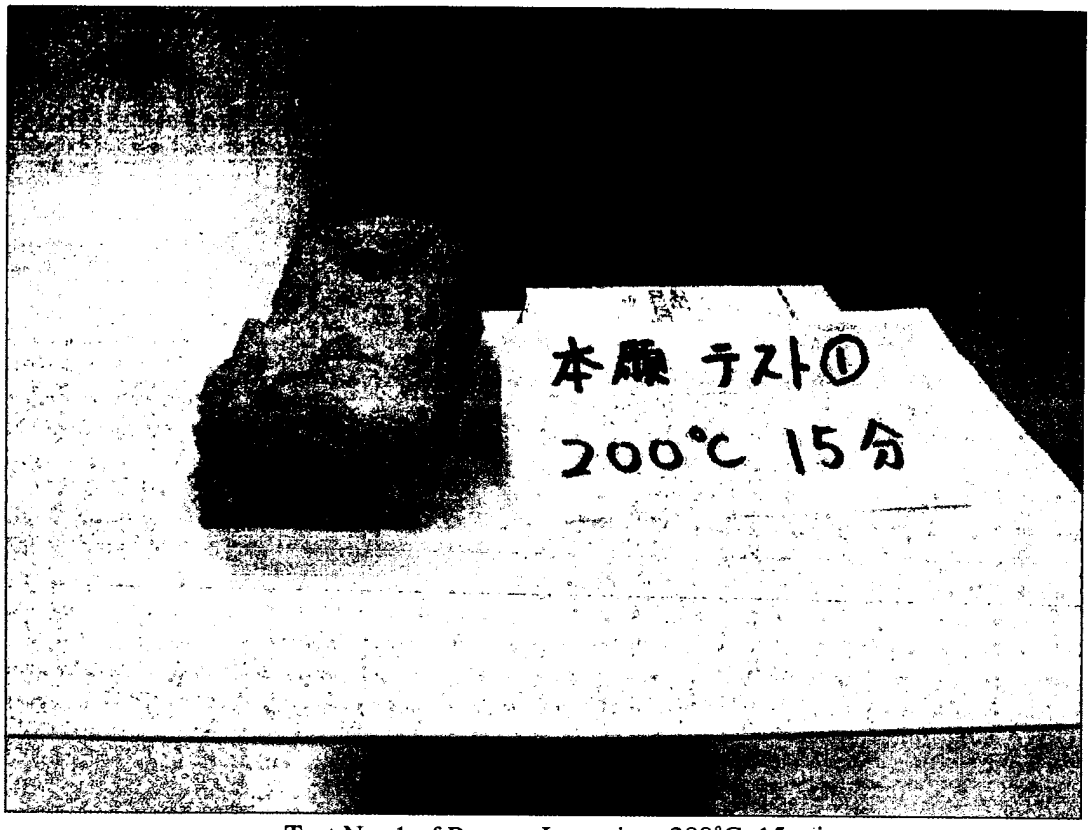
Results when convection oven was used (1/5)



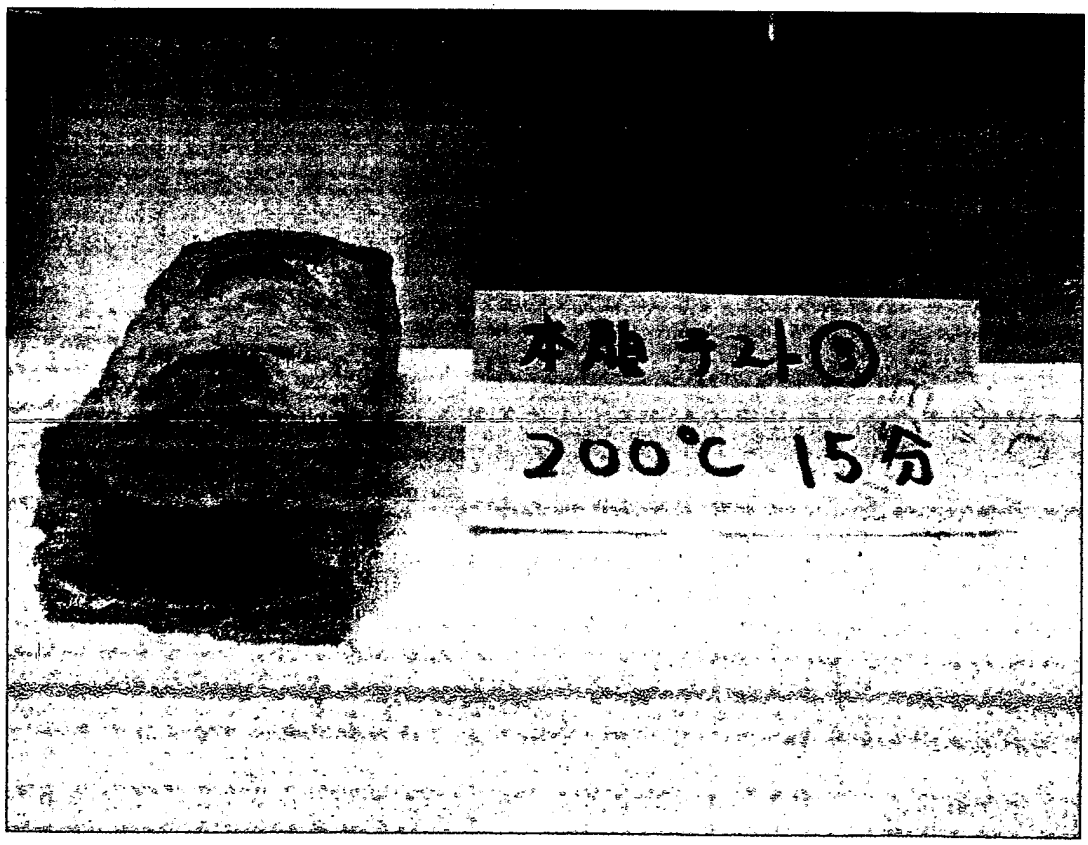


Test No. 2 of Present Invention; 200°C, 15 min.

Results when convection oven was used (2/5)

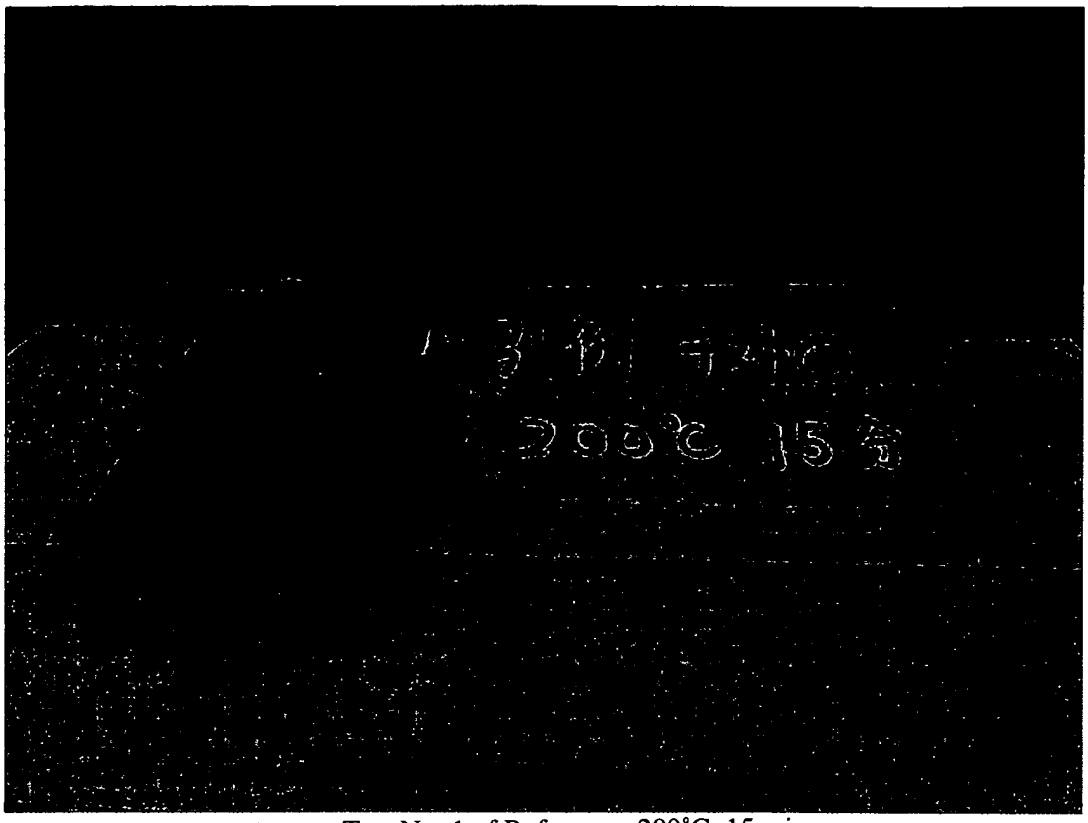


Test No. 1 of Present Invention; 200°C, 15 min.

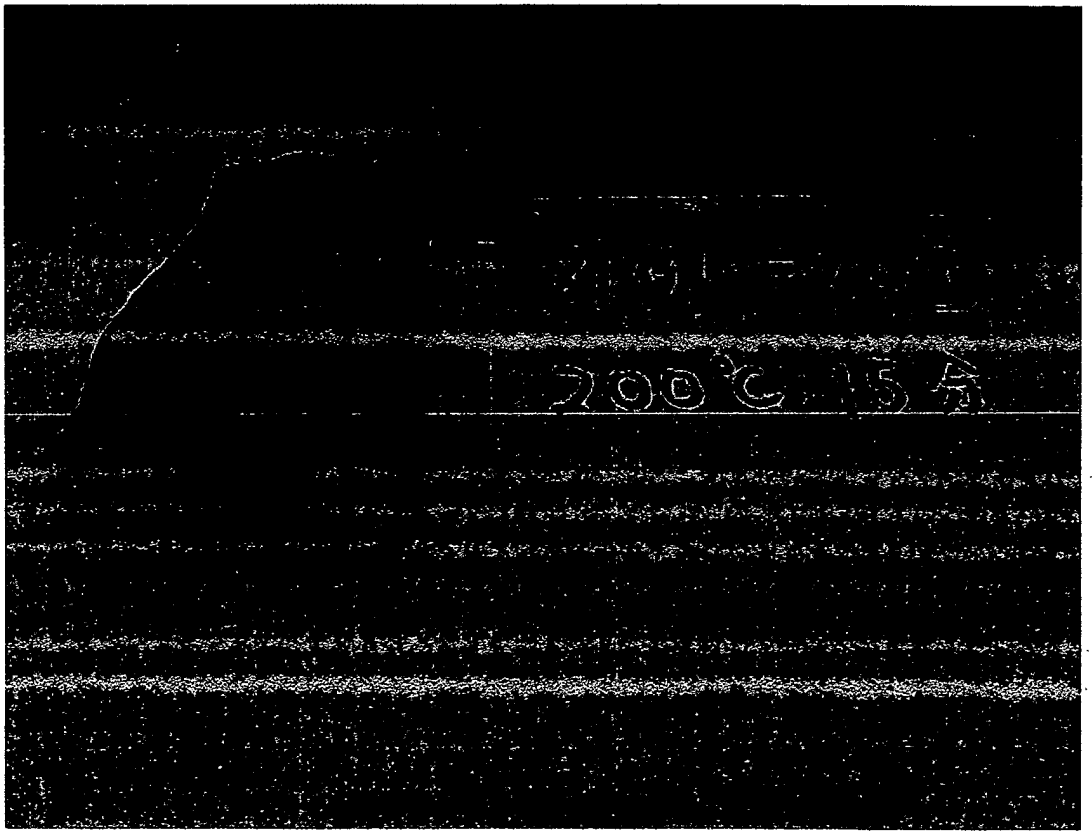


Test No. 3 of Present Invention; 200°C, 15 min.

Results when convection oven was used (3/5)

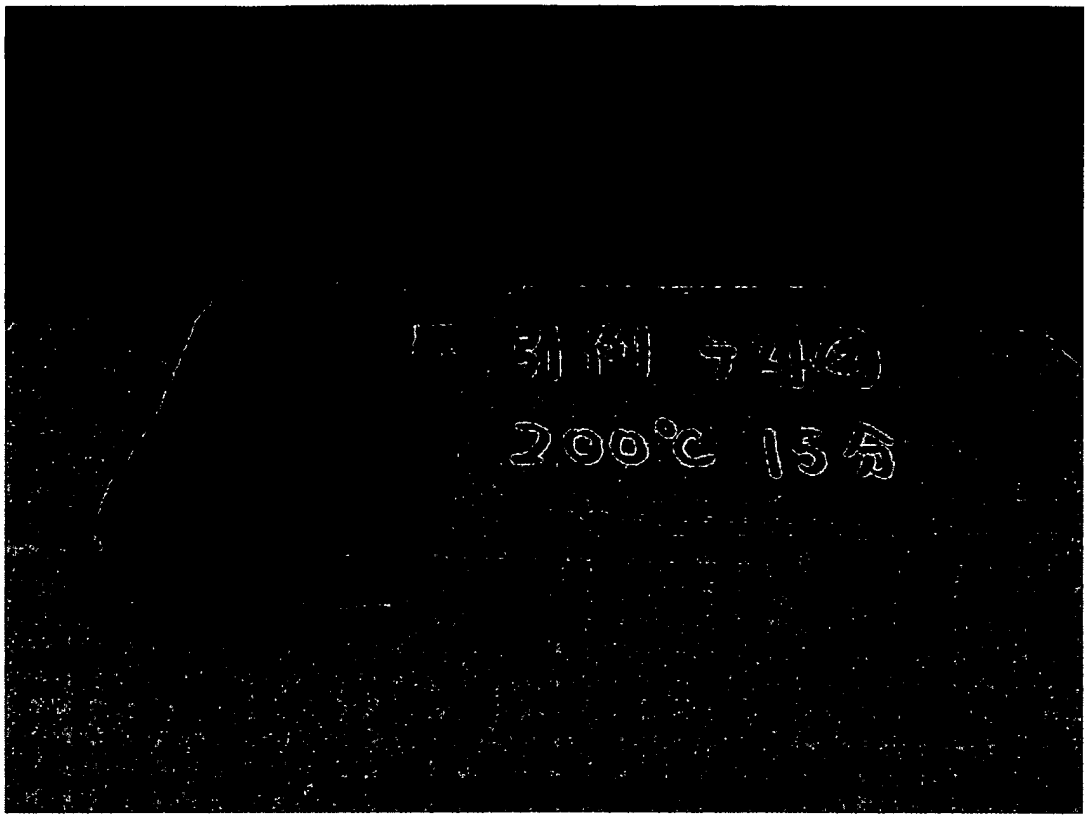


Test No. 1 of Reference; 200°C, 15 min.

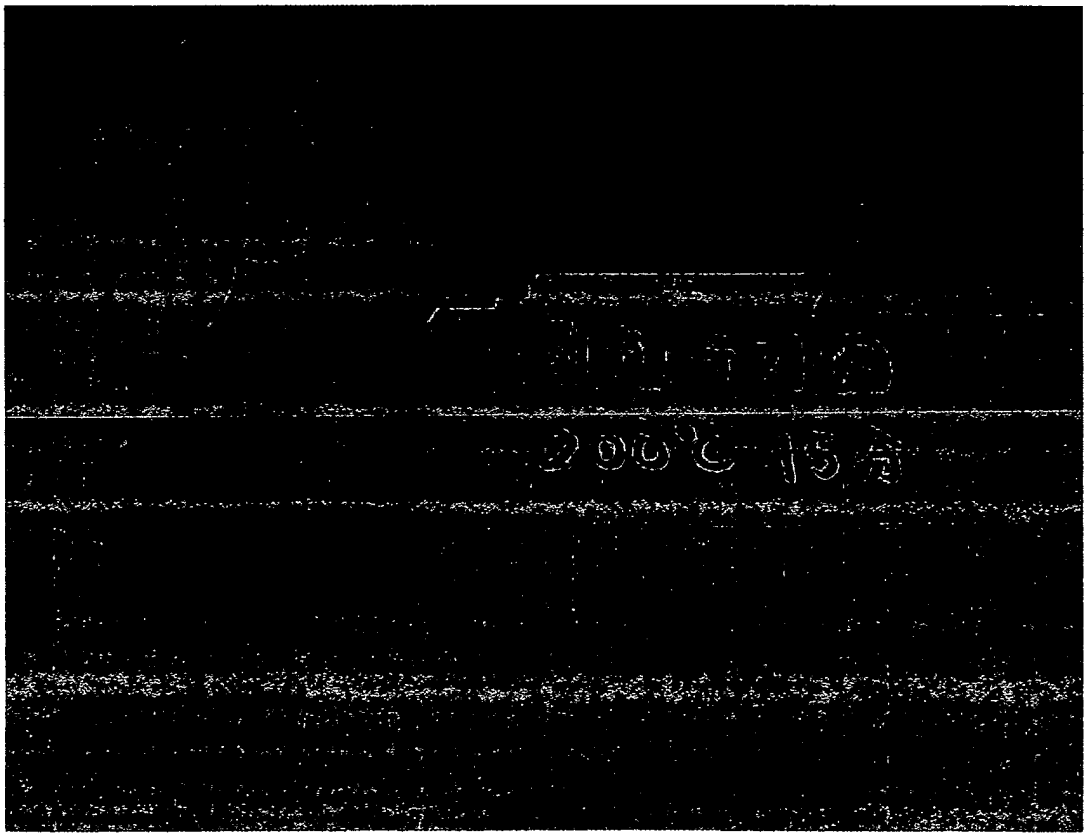


Test No. 3 of Reference; 200°C, 15 min.

Results when convection oven was used (4/5)

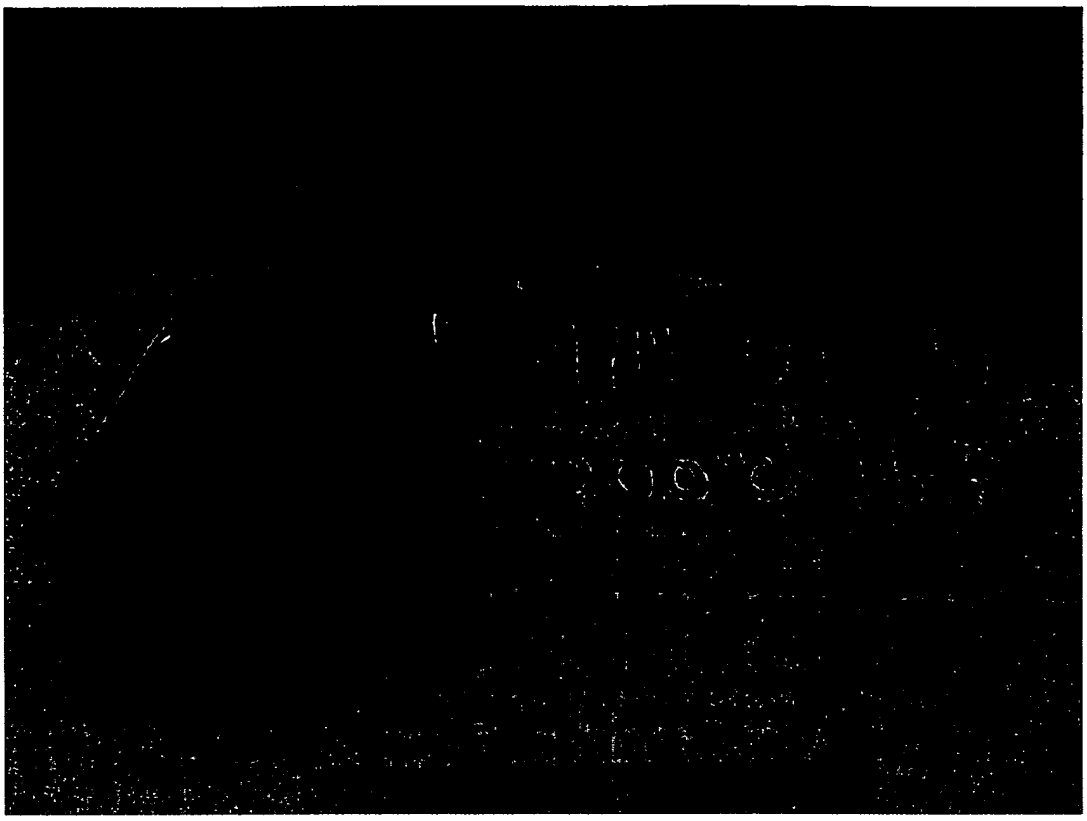


Test No. 2 of Reference; 200°C, 15 min.



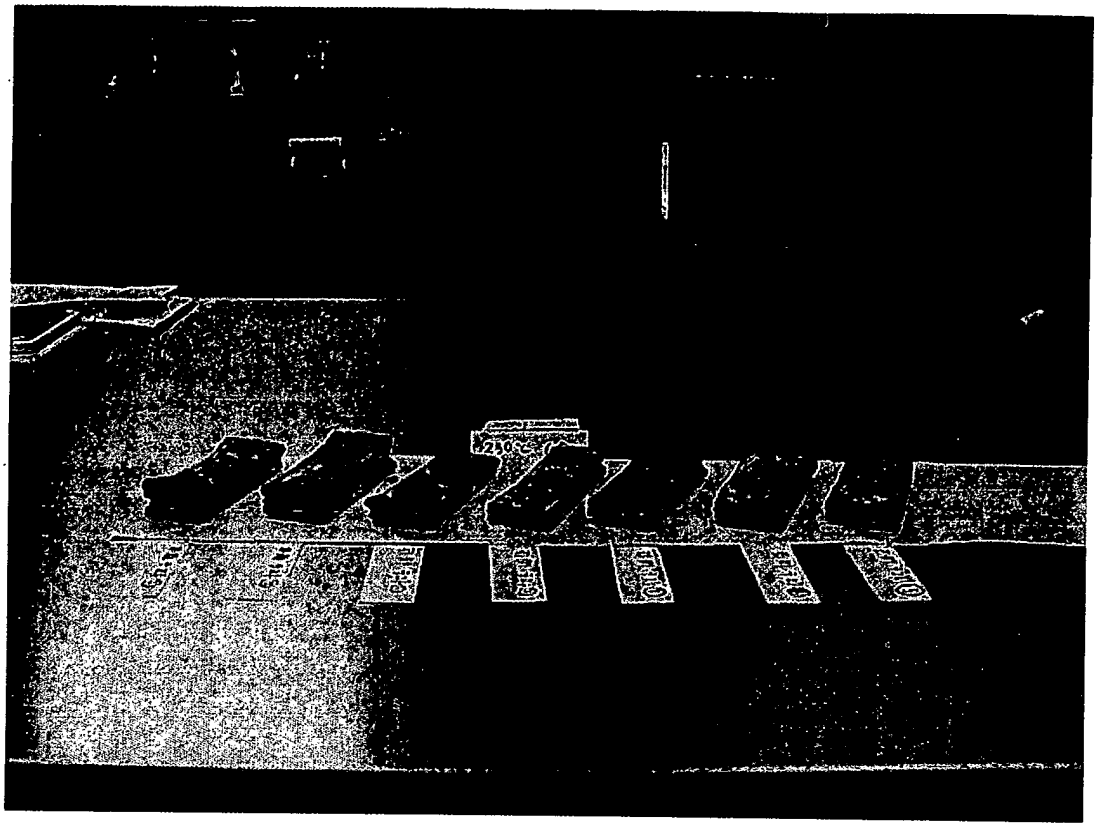
Test No. 4 of Reference; 200°C, 15 min.

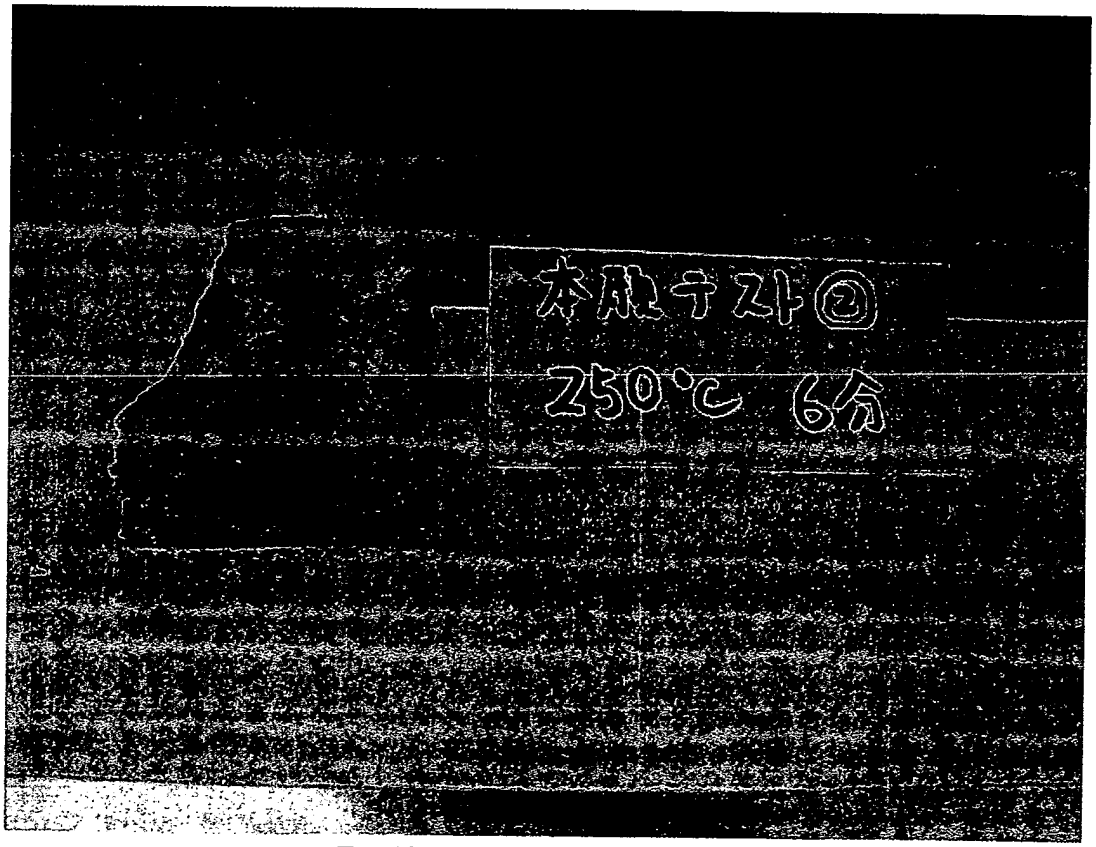
Results when convection oven was used (5/5)



Test No. 5 of Reference; 200°C, 15 min.

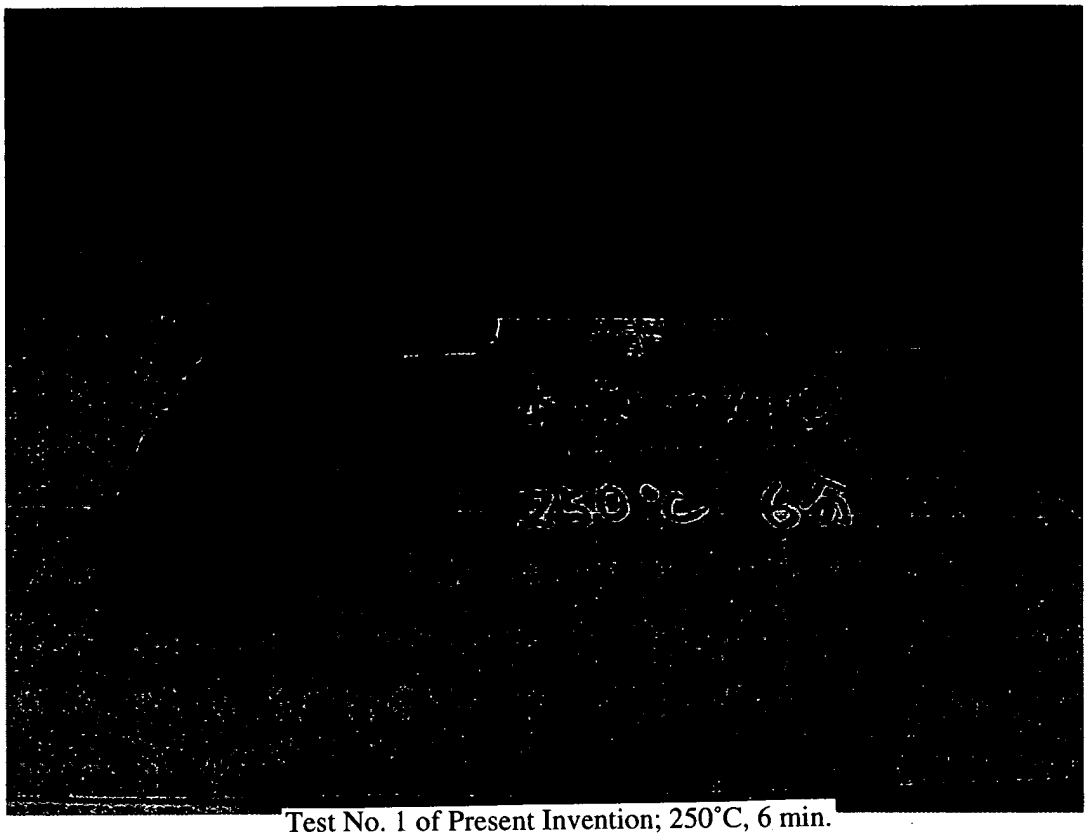
Results when jet oven was used (1/5)



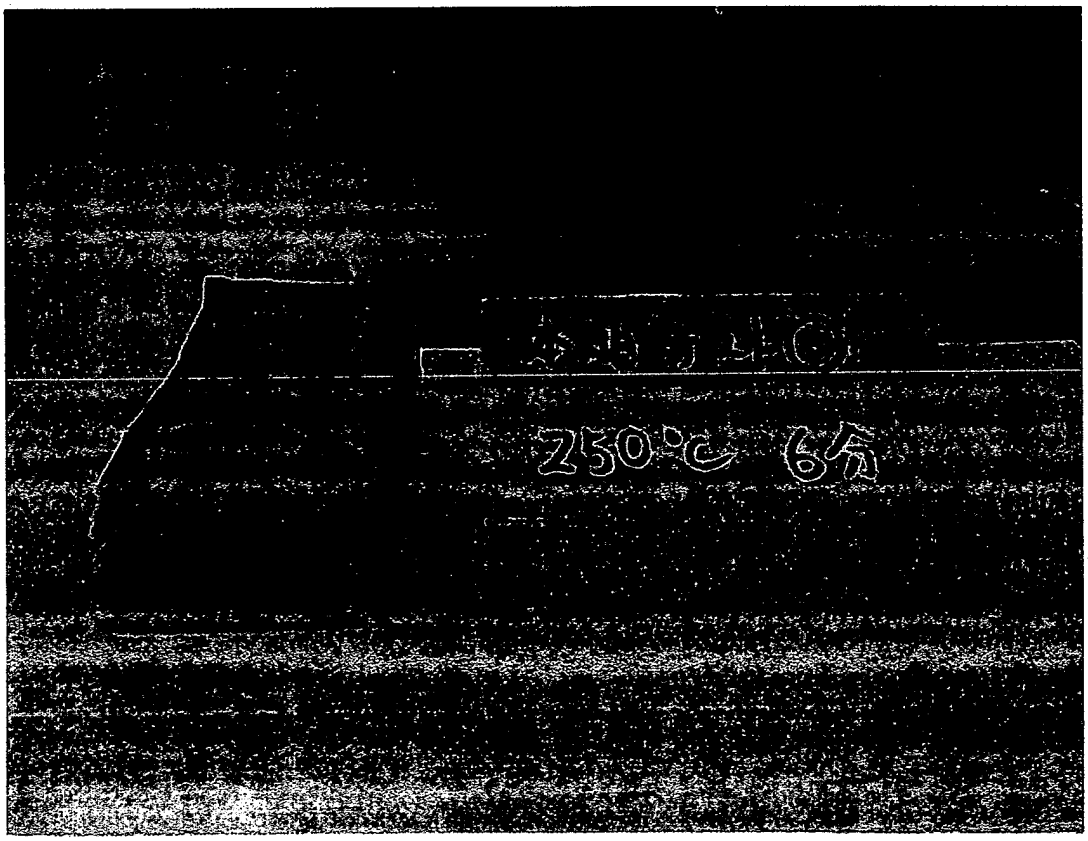


Test No. 2 of Present Invention; 250°C, 6 min.

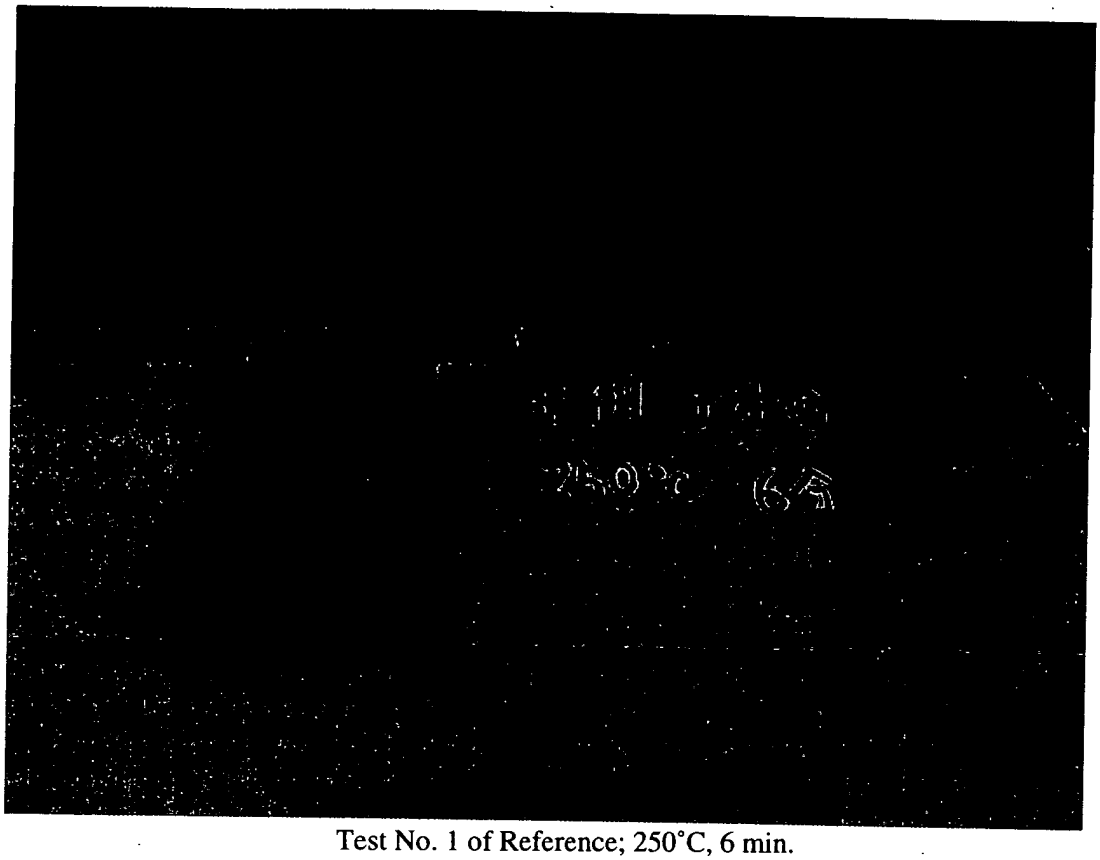
Results when jet oven was used (2/5)



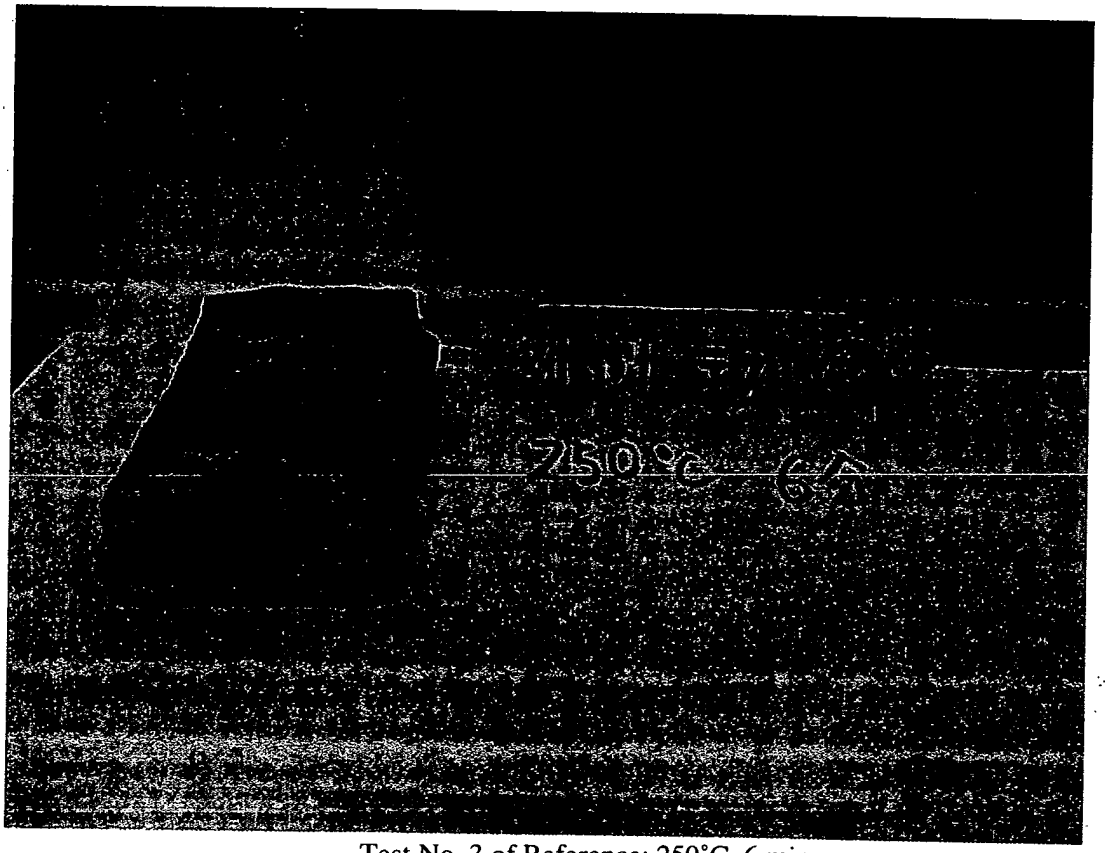
Test No. 1 of Present Invention; 250°C, 6 min.



Test No. 3 of Present Invention; 250°C, 6 min.

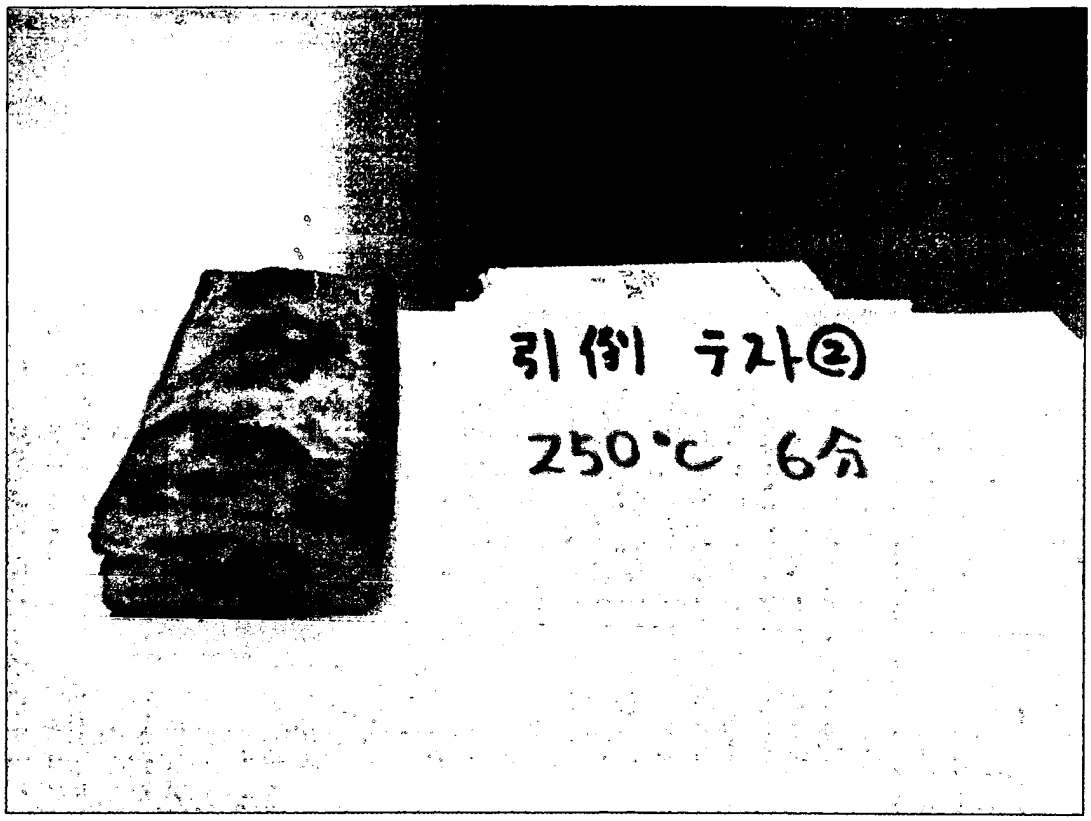


Test No. 1 of Reference; 250°C, 6 min.

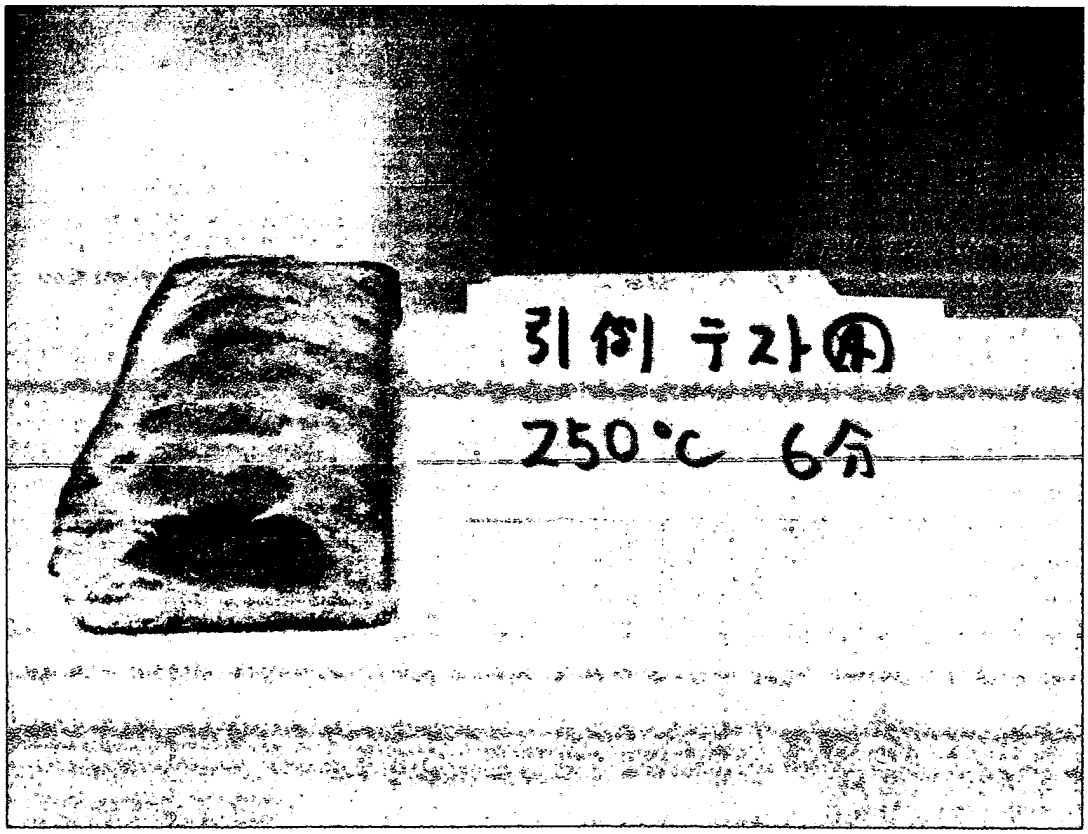


Test No. 3 of Reference; 250°C, 6 min.

Results when jet oven was used (4/5)

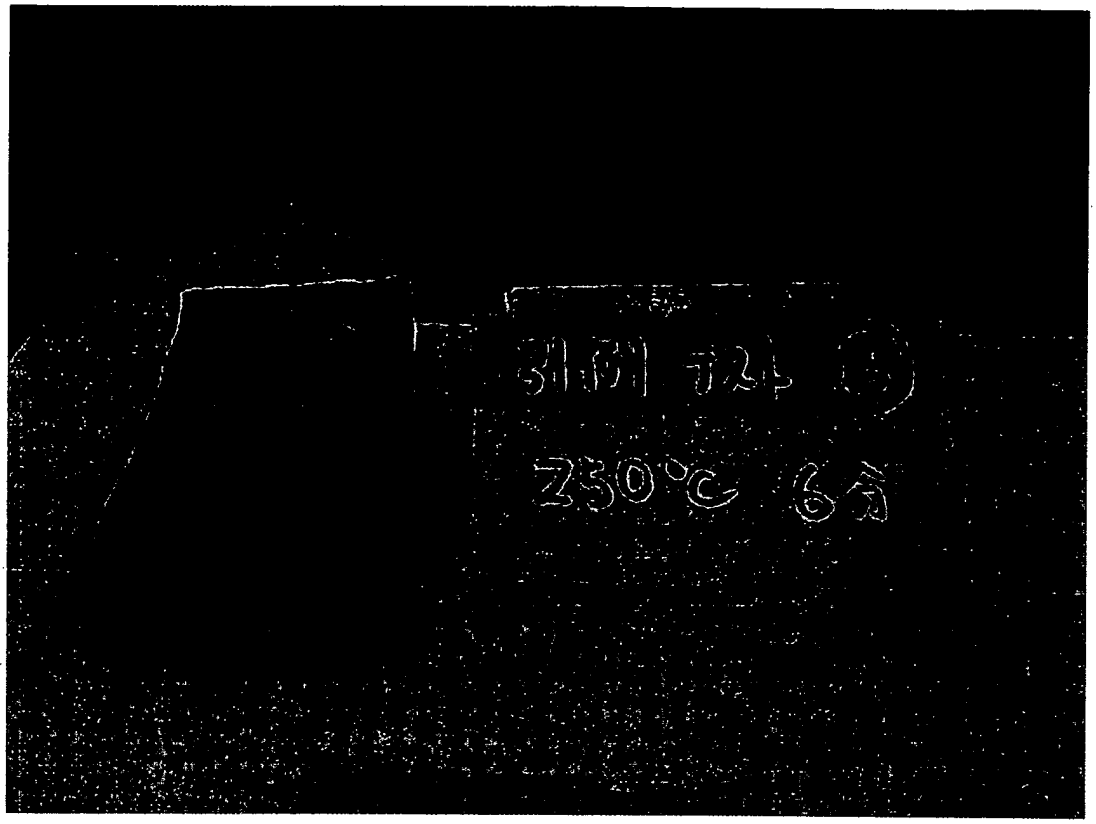


Test No. 2 of Reference; 250°C, 6 min.



Test No. 4 of Reference; 250°C, 6 min.

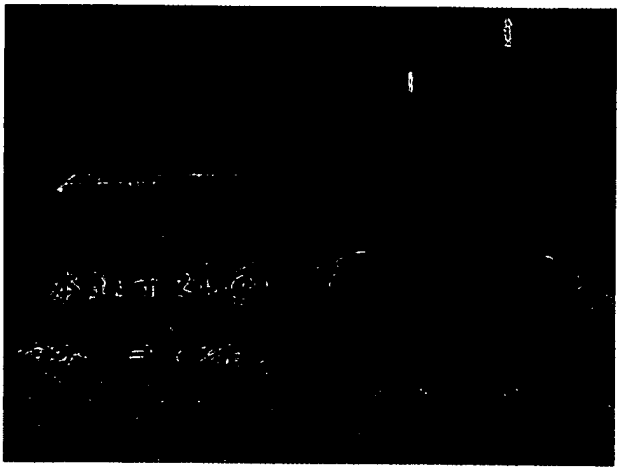
Results when jet oven was used (5/5)



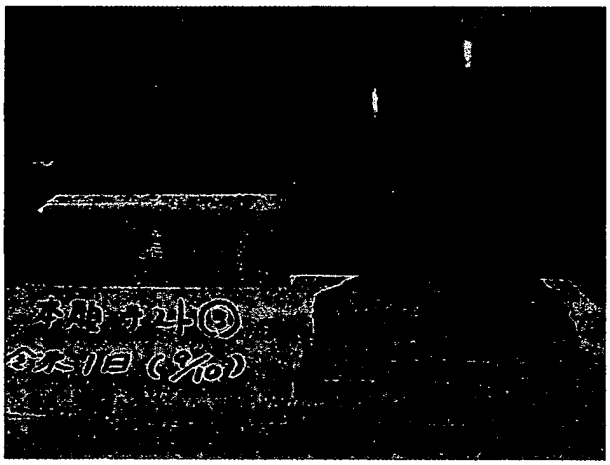
Test No. 5 of Reference; 250°C, 6 min.

Pie dough alone (1/2)

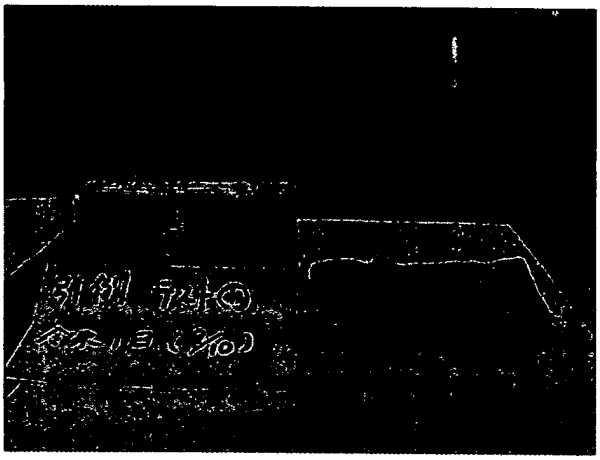
Test No. 1 of Present Invention (frozen for one day)



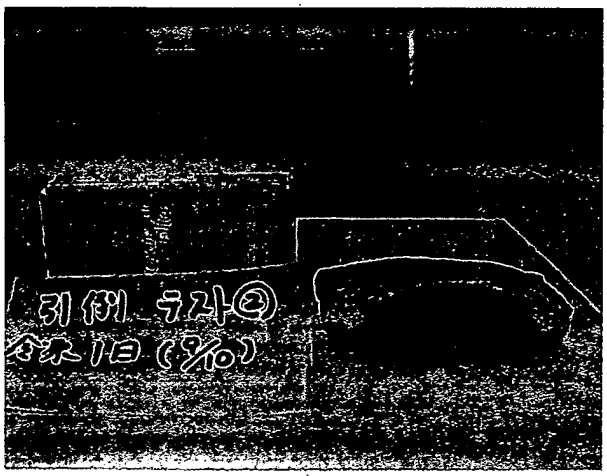
Test No. 2 of Present Invention (frozen for one day)



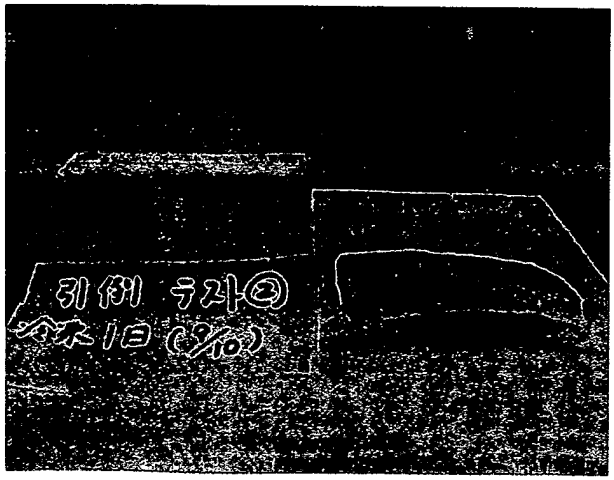
Test No. 3 of Present Invention (frozen for one day)



Test No. 1 of Reference (frozen for one day)

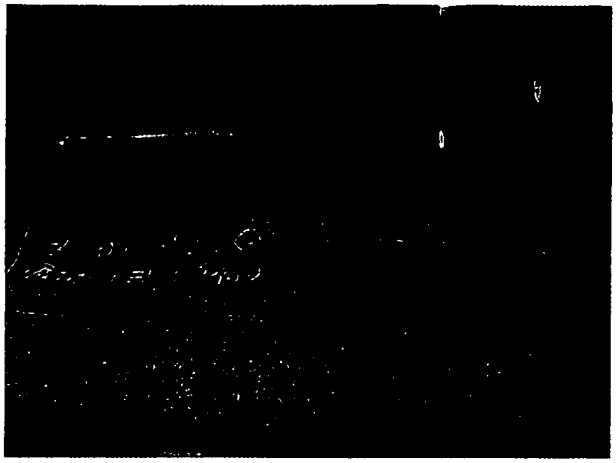


Test No. 2 of Reference (frozen for one day)



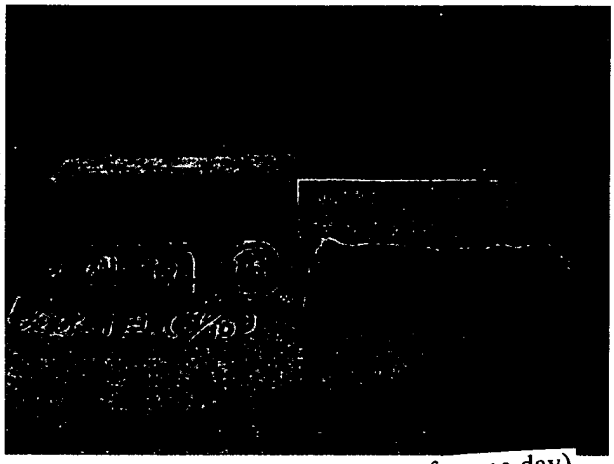
Test No. 2 of Reference (frozen for one day)

Pie dough alone (2/2)



Test No. 3 of Reference (frozen for one day)

Test No. 4 of Reference (frozen for one day)



Test No. 5 of Reference (frozen for one day)